

WHAT IS CLAIMED IS:

1. A liquid type identification device which identifies a liquid to be measured belonging to a hydrocarbon-based liquid or an alcohol-based liquid, comprising:

an identification sensor unit which faces a flow passage of the liquid to be measured, the identification sensor unit including a liquid type detection unit with indirect heating which includes a heating body and a temperature-sensitive body and including a liquid temperature detection unit which detects the temperature of the liquid to be measured; and

an identification calculation unit which applies a single pulse voltage to the heating body of the liquid type detection unit with indirect heating so as to generate heat and identifies the liquid to be measured according to an output of a liquid type detection circuit formed by the temperature-sensitive body of the liquid type detection unit with indirect heating and the liquid temperature detection unit,

wherein the identification calculation unit identifies the liquid to be measured according to a liquid-type-corresponding first voltage value and a liquid-type-corresponding second voltage value, the liquid-type-corresponding first voltage value corresponding to a difference between the initial temperature of the temperature-sensitive body and a first temperature thereof at a time point when a first time period has elapsed from the start of application of the single pulse, the liquid-type-corresponding second voltage value corresponding to a difference between the initial temperature of the temperature-sensitive body and a second temperature thereof at a time point when a second time period longer than the first time period has elapsed from the start of the application of the single pulse.

2. The liquid type identification device as claimed in claim 1, wherein the second time period is the application time of the single pulse.

5

3. The liquid type identification device as claimed in claim 1, wherein the first time period is $1/2$ or less of the application time of the single pulse.

10

4. The liquid type identification device as claimed in claim 1, wherein the first time period is 0.5 to 1.5 seconds.

5. The liquid type identification device as claimed in claim 1, wherein the application time of the single pulse is 3 to 10 seconds.

15

6. The liquid type identification device as claimed in claim 1, wherein an averaged initial voltage value obtained by sampling the initial voltage before the start of the single pulse application to the heating body for a predetermined number of times and averaging the sampled values is used as a voltage value corresponding to the initial temperature of the temperature-sensitive body; an averaged first voltage value obtained by sampling a first voltage at a time point when the first time period has elapsed from the start of the single pulse application to the heating body for a predetermined number of times and averaging the sampled values is used as a voltage value corresponding to the first temperature of the temperature-sensitive body; an averaged second voltage value obtained by sampling a second voltage at a time point when the second time period has elapsed from the start of the single pulse application to the heating body for a predetermined number of times and averaging the sampled values is used

30

as a voltage value corresponding to the second temperature of the temperature-sensitive body; a difference between the averaged first voltage value and averaged initial voltage value is used as the liquid-type-corresponding first voltage value; and a difference
5 between the averaged second voltage value and averaged initial voltage value is used as the liquid-type-corresponding second voltage value.

7. The liquid type identification device as claimed in claim 1, wherein a liquid temperature-corresponding output value
10 corresponding to the temperature of the liquid to be measured is input to the identification calculation unit from the liquid temperature detection unit, and the identification calculation unit uses a calibration curve indicating a relationship between the liquid temperatures and liquid-type-corresponding first voltage values of
15 a plurality of types of known reference liquids to be measured to determine whether the liquid to be measured is the hydrocarbon-based liquid or alcohol-based liquid based on the liquid temperature-corresponding output value and liquid-type-corresponding first voltage value obtained for the liquid to be measured.

20 8. The liquid type identification device as claimed in claim 7, wherein a liquid temperature-corresponding output value corresponding to the temperature of the liquid to be measured is input to the identification calculation unit from the liquid temperature
25 detection unit, and the identification calculation unit uses a calibration curve which is created respectively for the hydrocarbon-based liquid and alcohol-based liquid and which indicates a relationship between the liquid temperatures and liquid-type-corresponding second voltage values of a plurality of
30 types of known reference liquids to be measured belonging respectively

to the hydrocarbon-based liquid and alcohol-based liquid to identify the liquid to be measured based on the liquid temperature-corresponding output value, liquid-type-corresponding second voltage value and the determination result obtained for the liquid to be measured.

5

9. The liquid type identification device as claimed in claim 1, wherein the identification calculation unit includes a microcomputer.

10

10. The liquid type identification device as claimed in claim 1, wherein both the liquid type detection unit with indirect heating and liquid temperature detection unit respectively include a heat transfer member for liquid type detection unit and a heat transfer member for liquid temperature detection unit, which are used for heat exchange with the liquid to be measured.

15